

CLAIMS

What is Claimed is:

1. An extreme ultraviolet (EUV) radiation source for generating EUV radiation, said source comprising:

a source nozzle for emitting a target material stream to a target area, said nozzle including an exit orifice through which the target material stream is emitted; and

a laser source generating a laser beam, said laser beam impinging the target material stream at the target area to create a plasma that emits the EUV radiation, wherein the exit orifice of the source nozzle is at or greater than 10 cm away from the target area.

2. The source according to claim 1 wherein the exit orifice of the source nozzle is about 180 mm away from the target area.

3. The source according to claim 1 wherein the source nozzle includes a capillary tube through which the target material stream is emitted.

4. The source according to claim 1 wherein the target material stream is emitted from the source nozzle as a liquid stream, and wherein the target material stream effectively freezes before it reaches the target area.

5. The source according to claim 1 wherein the target material stream is selected from the group consisting of a cylindrical filament, a plurality of spaced apart cylindrical filaments, a stream of droplets and a target sheet.

6. The source according to claim 1 wherein the target material is xenon.

7. An extreme ultraviolet (EUV) radiation source for generating EUV radiation, said source comprising:

a source nozzle for emitting a target material stream to a target area, said nozzle including an exit orifice through which the target material stream is emitted; and

a laser source generating a laser beam, said laser beam impinging the target material stream at the target area to create a plasma that emits the EUV radiation, wherein the exit orifice of the source nozzle is far enough away from the target area so that the EUV radiation is not significantly absorbed by target vapor proximate the exit orifice.

8. The source according to claim 7 wherein the exit orifice of the source nozzle is greater than 10 cm away from the target area.

9. The source according to claim 7 wherein the target material stream is emitted from the source nozzle as a liquid stream, and wherein the target material stream completely freezes before it reaches the target area.

10. The source according to claim 7 wherein the target material stream is selected from the group consisting of a cylindrical filament, a plurality of spaced apart cylindrical filaments, a stream of droplets and a target sheet.

11. An extreme ultraviolet (EUV) radiation source for generating EUV radiation, said source comprising:

a source nozzle for emitting a target material stream to a target area, said nozzle including an exit orifice through which the target material stream is emitted, said target stream traveling slow enough so that it is completely frozen when it reaches the target area; and

a laser source generating a laser beam, said laser beam impinging the target material stream at the target area to create a plasma that emits the EUV radiation.

12. The source according to claim 11 wherein the stream travels 10 millimeters per second.

13. A method for generating EUV radiation, said method comprising:
emitting a target material stream from a source nozzle to a target area in a vacuum chamber; and
impinging the target material stream at the target area with a laser beam to create a plasma that emits the EUV radiation, wherein the target material stream travels a far enough distance from the source nozzle to the target area so that the EUV radiation is not significantly absorbed by target vapor proximate the source nozzle.
14. The method according to claim 13 wherein the target material stream travels farther than 10 cm from the source nozzle to the target area.
15. The method according to claim 14 wherein the target material stream travels about 180 mm from the source nozzle to the target area.
16. The method according to claim 13 wherein the target material stream is emitted from the source nozzle as a liquid stream, and wherein the target material completely freezes before it reaches the target area.
17. The method according to claim 13 wherein the target material stream is selected from the group consisting of a cylindrical filament, a plurality of spaced apart cylindrical filaments, a stream of droplets and a target sheet.